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The future Joint Force will engage in an operating environment that is a complex mixture of uncertainty, change, and conflict. Among these complexities, global access will be challenged by anti-access and area-denial measures, focused on limiting the Joint Force's freedom of action in a persistent combination of combat, security, engagement, and relief and reconstruction operations. Furthermore, resource constraints will produce military-wide reductions and necessitate a more economical approach to global logistics. As efficiencies are achieved, though, global logistics must effectively sustain the Joint Force. A key factor of success or failure is the effectiveness and efficiency of the logistics enterprise, of which the supply chain is an enabling capability. The current Department of Defense (DoD) supply chain has reached its highest potential, and is neither effective nor efficient enough to meet the requirements of the Joint Force amidst the demands of the future operating environment. Therefore, a new emphasis is needed to achieve an optimal strategic fit between the national defense strategy and the supply chain strategy. The fit will be made possible by changes in DoD logistics policy, strategy, organizational structure, management, and processes. Additionally, best business practices in the commercial sector must continue to be adopted and adapted to the military environment, thereby providing benchmarks that will position the DoD supply chain on the leading edge of global logistics. With these changes, the DoD supply chain will be optimized to support the future Joint Force in a complex and challenging operating environment.

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NATIONAL DEFENSE UNIVERSITY

JOINT FORCES STAFF COLLEGE

JOINT ADVANCED WARFIGHTING SCHOOL

OPTIMIZING THE DOD SUPPLY CHAIN FOR THE FUTURE JOINT FORCE

by

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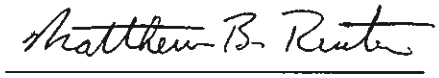
A paper submitted to the Faculty of the Joint Advanced Warfighting School in partial satisfaction of the requirements of a Master of Science Degree in Joint Campaign Planning and Strategy. The contents of this paper reflect my own personal views and are not necessarily endorsed by the Joint Forces Staff College or the Department of Defense.

This paper is entirely my own work except as documented in footnotes.

Signature: 

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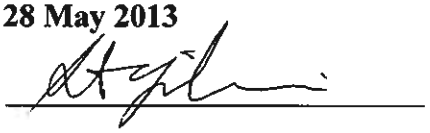
Thesis Adviser: Signature: 

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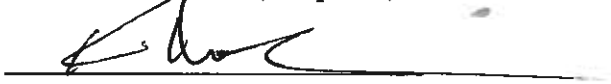
Approved by: Signature: 

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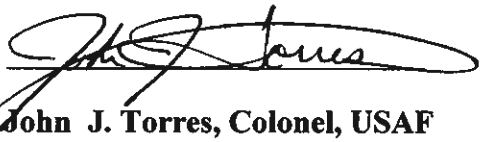
Signature: 

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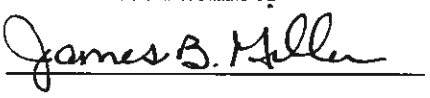
Signature: 

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ABSTRACT

The future Joint Force will engage in an operating environment that is a complex mixture of uncertainty, change, and conflict. Among these complexities, global access will be challenged by anti-access and area-denial measures, focused on limiting the Joint Force's freedom of action in a persistent combination of combat, security, engagement, and relief and reconstruction operations. Furthermore, resource constraints will produce military-wide reductions and necessitate a more economical approach to global logistics. As efficiencies are achieved, though, global logistics must effectively sustain the Joint Force. A key factor of success or failure is the effectiveness and efficiency of the logistics enterprise, of which the supply chain is an enabling capability. The current Department of Defense (DoD) supply chain has reached its highest potential, and is neither effective nor efficient enough to meet the requirements of the Joint Force amidst the demands of the future operating environment. Therefore, a new emphasis is needed to achieve an optimal strategic fit between the national defense strategy and the supply chain strategy. The fit will be made possible by changes in DoD logistics policy, strategy, organizational structure, management, and processes. The breadth and depth of these changes will only be possible through a re-focusing of DoD logistics towards the end-to-end supply chain. Additionally, best business practices in the commercial sector must continue to be adopted and adapted to the military environment, thereby providing benchmarks that will position the DoD supply chain on the leading edge of global logistics. With these changes, the DoD supply chain will be optimized to support the future Joint Force in a complex and challenging operating environment.

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CHAPTER 1: INTRODUCTION

Orientation

History has proven that the military force that understands the operating environment and adapts to change will be successful in the conduct of warfare. For the desired endstates, the operating environment's critical factors provide a distinct focus that informs the development of the military force's ways and means of conducting warfare. For the future Joint Force, the operating environment will be a complex mixture of uncertainty, change, and conflict. Amidst these complexities, global access will be challenged by anti-access and area-denial measures, focused on limiting the Joint Force's engagement in a persistent combination of combat, security, engagement, and relief and reconstruction operations. To succeed in this broad spectrum of missions, operations must be globally integrated and mutually supporting across domains. Within these parameters, Joint Force sustainment will require precise actions over widely dispersed logistics nodes.

Unfortunately, global integration and cross-domain mutual support will be challenged by resource constraints generated by the Department of Defense's (DoD) decreasing budget. This decreasing budget, directed in the Budget Control Act of 2011, will reduce the defense budget by $487 billion over the next 10 years. The resulting resource constraints will produce military-wide reductions and necessitate a more economical approach to global logistics. As economies are achieved, though, global logistics must effectively sustain the Joint Force. Sustaining the Joint Force is a clear priority in the 2010 Quadrennial Defense Review (QDR), which states "…effective and efficient delivery of logistical support to our men and women in the field is an enduring

priority and an area where continued improvements must be made."[1] To enable this enduring priority, the QDR establishes the objective of reforming DoD institutions and processes to better support warfighter urgent needs, while ensuring good stewardship of taxpayer funded defense resources.

The enabling capability that logistically sustains the Joint Force is the DoD supply chain. This supply chain links the defense industrial base to the Joint Force's tactical organizations. Yet this supply chain is not optimally managed from end-to-end, thereby producing inefficiencies that degrade its effectiveness. The DoD supply chain has been classified as "High Risk" by the Government Accounting Office (GAO) since 1990. This classification necessitates broad reform to prevent waste, fraud, abuse, and mismanagement of taxpayer funded defense resources. Through its research, the GAO identified five common deficiencies within the DoD supply chain: management oversight, performance tracking, planning, policy, and processes.[2] The July 2010 DoD Logistics Strategic Plan provides strategic direction for improvements in DoD supply chain management, but lacks specificity in the areas of performance measurement, capability gaps, resources, and linkages to the logistics enterprise.[3]

Thesis Statement

The DOD supply chain must be optimized to meet the requirements of the future Joint Force operating environment and align with best business practices. The goal of this thesis research is to identify how to improve the effectiveness and efficiency of the

[1] U.S. Department of Defense, *Quadrennial Defense Review Report* (Washington, DC: Government Printing Office, 2010), 76.

[2] U.S. Government Accountability Office, *DOD'S HIGH-RISK AREAS. Progress Made Implementing Supply Chain Management Recommendations, but Full Extent of Improvement Unknown* (Washington, DC: Government Printing Office, 2007), 5.

[3] U.S. Government Accountability Office, *DOD'S HIGH-RISK AREAS. Observations on DOD's Progress and Challenges in Strategic Planning for Supply Chain Management* (Washington, DC: Government Printing Office, 2010), 2.

DoD supply chain. Sub-optimal conditions exist that degrade support to the Joint Force, yet there remains no single manager who is focused on executing the end-to-end supply chain process. These conditions will become more severe as DoD operates in the future environment as described in the Capstone Concept for Joint Operations (CCJO) and the Joint Operational Access Concept (JOAC).

This thesis research is relevant to the Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics (USD(AT&L)), Office of the Assistant Secretary of Defense for Logistics and Materiel Readiness (ASD(L&MR)), Office of the Deputy Assistant Secretary of Defense for Supply Chain Integration (DASD(SCI), Joint Staff Logistics Directorate, United States Transportation Command (USTRANSCOM), Defense Logistics Agency (DLA), Combatant Command Logistics Directorates, and other DoD supply chain stakeholders.

Methodology

The thesis research methodology consisted of a literature review, organizational and supply chain management research, an analysis of policy and supply chain operations, and an analysis of best business practices. The operating environment described in the CCJO and JOAC provided the context for the future Joint Force's resources and requirements. The scope of the end-to-end supply chain addressed in the thesis research is primarily at the strategic and operational levels of logistics, with limited focus on manufacturing, acquisition, retail distribution, and asset visibility. Current documents containing Defense logistics policy and Joint logistics strategy were reviewed to determine the level of supply chain integration within the DoD logistics enterprise. The current capabilities of USTRANSCOM and DLA were analyzed to determine the

degree of their overall effectiveness and efficiency in sustaining the Joint Force. Additionally, information from Operation IRAQI FREEDOM (OIF) and Operation ENDURING FREEDOM (OEF) was incorporated to highlight how DoD supply chain management affects Joint Force operations. Lastly, leading commercial sector supply chain management processes were evaluated to identify best business practices that DoD could emulate and utilize amidst current DoD budgetary constraints. Ultimately, the research focused on how to improve the effectiveness and efficiency of the DoD supply chain.

CHAPTER 2: SUPPLY CHAIN

History

The importance of well-developed supply lines for sustaining a large army is initially shown in the second half of the 17th Century. Michel Le Tellier and his son Louvois established a network of supply magazines that enabled the French army to expand and conduct operations that led to Louis XIV's rule over Europe.[1] Thus began the logistics concept, of provisioning instead of foraging, that sustained military forces operating in foreign countries. Warfare in the 18th and 19th Centuries required more complex supply structures to sustain forces that were deployed for longer periods over greater distances. Active provisioning remained an important variable that affected the success or failure of military operations, as was proven by the British loss in the American Revolutionary War and in Napoleon's failed Russian campaign in 1812.

The world wars and conflicts in the 20th Century refined concepts of sustainment for large military forces operating in demanding environments. These events highlighted the importance of the defense industrial base, global transportation, and regional supply distribution. A greater emphasis on logistics command and control was developed in order to support operational-level maneuver and more complex military equipment.

The supply chain concept and supporting processes were developed in the latter half of the 20th Century. Their formation was the result of a three-phase evolution in commercial and military logistics that began in the 1960s and ended in the 1990s, as depicted in Figure 2-1. During this period, numerous fragmented logistics processes

[1] Martin Van Creveld, *Supplying War: Logistics from Wallenstein to Patton* (New York: Cambridge University Press, 1977), 17-26.

became increasingly integrated as a result of technological advancements and business competition. This integration produced a physical distribution concept along with a focus on the outbound side of the logistics system. The analysis of total system cost led to a systems concept that identified strong relationships between cost and performance when managing purchasing, inventory, warehousing, packaging, transportation, and other necessary functions. With transportation costs being the driving variable in this period's system, physical distribution management became a focus area for logistics managers. The 1980's saw the deregulation of transportation and financial institutions, as well as a revolution in technology. These changes combined to produce an integrated logistics management concept, which modified the physical distribution concept by connecting inbound logistics to outbound logistics. This connection became increasingly important with the global sourcing of products and materials, thereby making transportation scheduling a key aspect of process management. Global competition in the 1990's elevated the focus on total system cost. To remain competitive, organizations optimized their integrated logistics processes using a management concept that focused on the end-to-end process chain: supply chain management was the resulting concept.[2]

[2] John J. Coyle, Edward J. Bardi, and C. John Langley Jr., *The Management of Business Logistics: A Supply Chain Perspective*, 7th ed. (Canada: South-Western, 2003), 13-14.

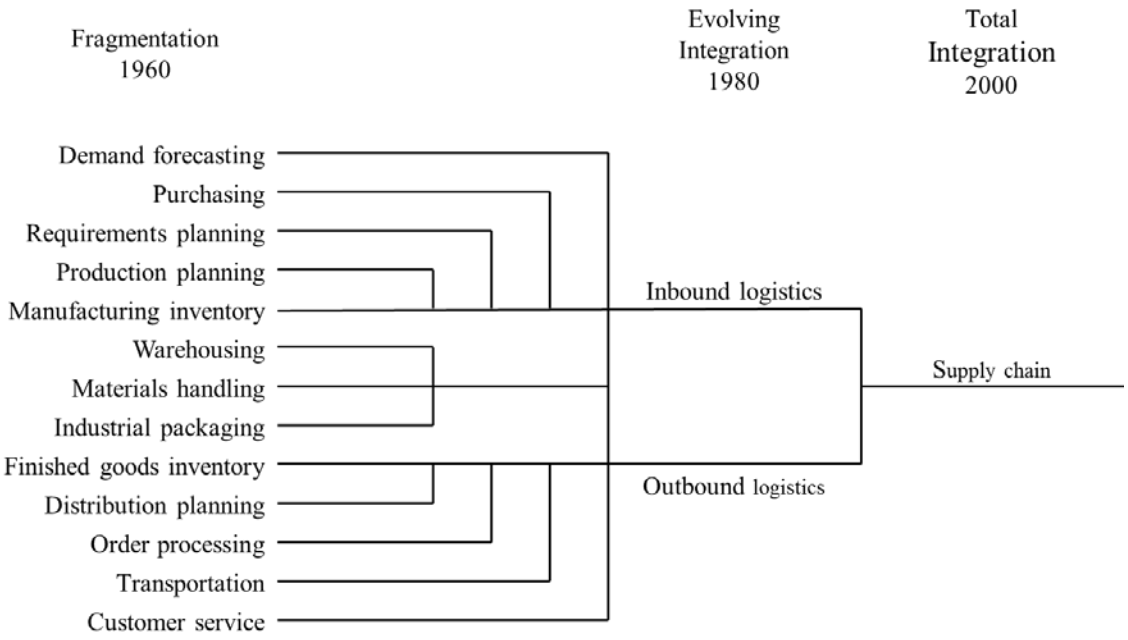

Figure 2.1. Logistics evolution.[3]

The conceptualization of supply chain management was first perceived by Keith Oliver in 1982. As a Booz Allen Hamilton management consultant who was supporting Phillips electronics, he described supply chain management as the process of planning, implementing, and controlling supply chain operations, with the purpose of efficiently satisfying customer requirements. He clarified that it spans the movement and storage of raw materials, work-in-process inventory, and finished goods, from point-of-origin to point-of-consumption. The concept was further explained by J. B. Houlihan in 1985, who emphasized the efficiencies and mutual benefits produced from information sharing and coordination within a supply chain.[4]

Concepts

A complete end-to-end supply chain consists of interdependent stages, processes, and flows. The stages include the component or raw material supplier, product

[3] Ibid., 14.

[4] Stephen Hays Russel, "Supply Chain Management: More Than Integrated Logistics," *Air Force Journal of Logistics* 31, no. 2 (Summer 2007): 58.

manufacturer, wholesale distributor, retailer, and customer. The processes that occur within and between the stages are the procurement cycle, manufacturing cycle, replenishment cycle, and customer order cycle. Through these processes flow information, product, and funds that create the interdependent nature of a supply chain. The environment that contains the supply chain's stages, processes, and flows is described as a "pipeline or conduit for the efficient and effective flow of products/materials, services, information, and financials from the supplier's suppliers through various intermediate organizations/companies out to the customer's customers,"[5] and is depicted in Figure 2.2. All of this activity is focused on meeting customer needs and, simultaneously, generating some form of profit.

[5] Ibid., 15.

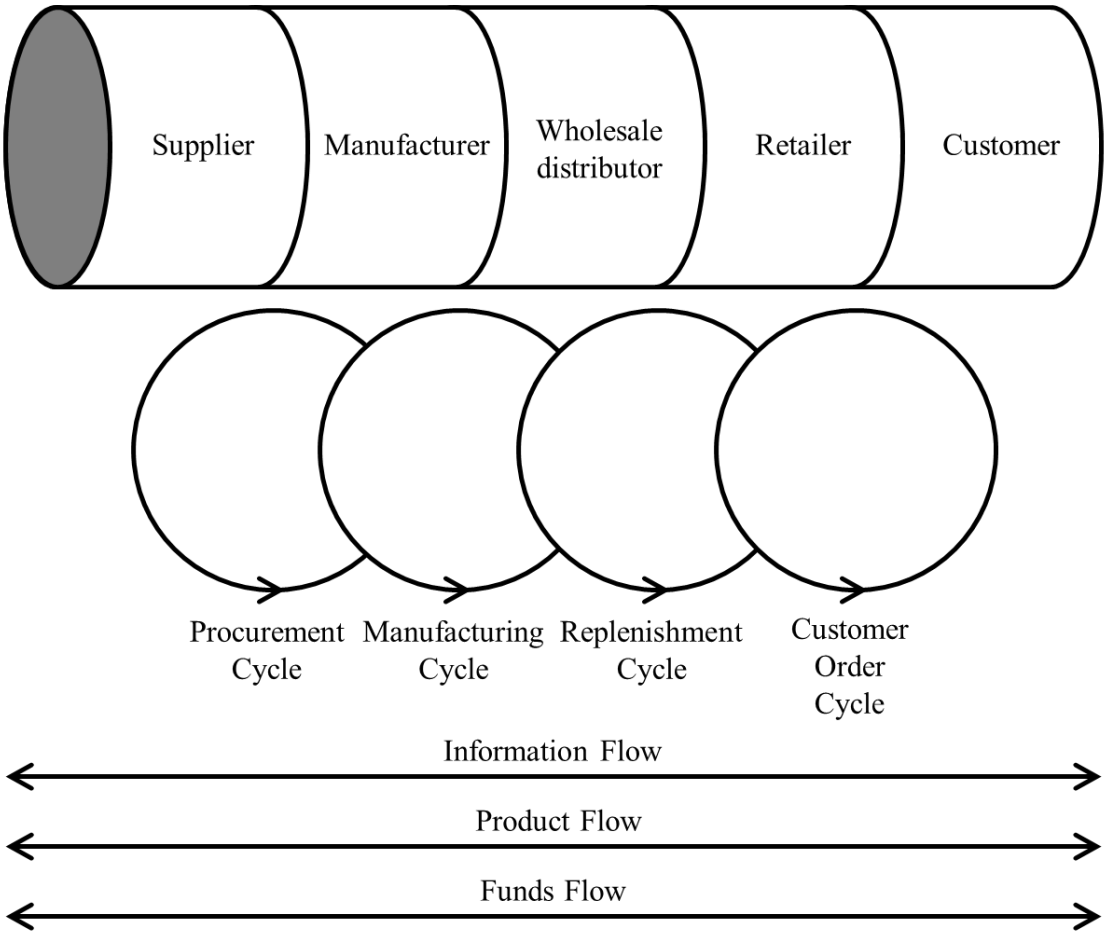

Figure 2.2. Supply chain stages, processes, and flows.

The Supply Chain Council (SCC), founded in 1996, produced and maintains the Supply Chain Operations Reference (SCOR) model, which is the SCC's consensus view of supply chain management. The SCOR model, shown in Figure 2.3, provides a framework to guide processes, metrics, best practices, and technology towards more effective and efficient supply chains.[6] The model, consisting of the Plan, Source, Make, Deliver, and Return processes, is widely used throughout the commercial sector, and more recently in DoD. Its use is promoted by the SCC as described in the following statement:

[6] Supply Chain Council, *Supply Chain Operations Reference (SCOR) model: Overview – Version 10.0* (Cypress, TX: Supply Chain Council, 2010), 6.

> A process reference model can be a powerful management tool. Once a complex management process is captured in standard process reference model form, it can be measured, managed, and controlled. It can also be tuned and re-tuned to achieve a specific purpose or attain a competitive advantage.[7]

Once an organization's supply chain configuration is captured, its performance can be measured in the areas of reliability, responsiveness, agility, cost, and assets. Lastly, as organizations endeavor to improve their supply chains, they use a combination of process improvement methods, to include process re-engineering, Lean Manufacturing, Six-Sigma, Theory of Constraints, ISO-9000 family of standards, Balanced Scorecard, and benchmarking.[8]

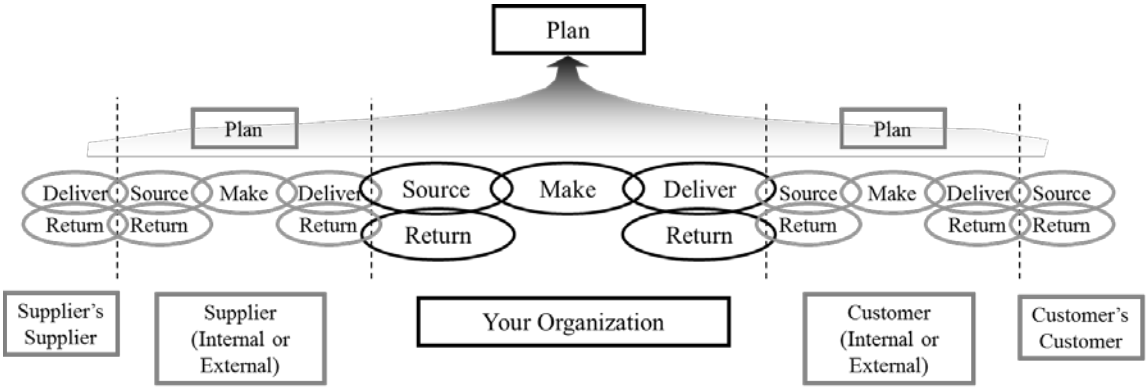

Figure 2.3. Supply Chain Operations Reference (SCOR) model.[9]

The benefits of supply chain management are well documented. The SCC annually captures business statistics that represent the benefits of an organizational focus on supply chain management. In the 2012 survey of 503 organizations that manage global supply chains, leading organizations showed the following results: (1) 70% higher

[7] Ibid.

[8] Supply Chain Council, "How Do I Use Scor?," Supply Chain Council, http://supply-chain.org/scor (accessed January 2, 2013).

[9] Supply Chain Council, *Supply Chain Operations Reference (SCOR) model: Overview – Version 10.0* (Cypress, TX: Supply Chain Council, 2010), 6.

performance where the supply chain is a strategic asset, (2) 4% higher earnings before interest and taxes, (3) 7% higher perfect delivery performance, and (4) 7% higher inventory turns per year.[10] The SCC also formally recognizes commercial and military organizations for their supply chain initiatives. The U.S. Air Force was recognized by the SCC in 2008 and 2012 for supply chain initiatives that improved performance and reduced costs. The 2008 recognition was for an effort to transform collaboration between the acquisition and sustainment communities. It used the SCOR model as a standard framework to guide the transformation effort. The results produced $6.75 billion in Operations and Support savings over the Fiscal Year (FY) 2006 to 2011 period.[11] The 2012 recognition was for an effort to improve supply support to depot maintenance facilities. Specifically, this initiative employed the SCOR model to focus on manufacturing and materiel shortages, KC-135 flight control overhaul issues, and aircraft engine shortages. The SCOR model's process analysis and improvement framework assisted in transforming each of these areas. Highlights include $210 million in cost avoidance savings while increasing aircraft availability, $3.5 million in savings in the area of parts obsolescence, improvements in KC-135 Mean Time To Repair, and an increase in KC-135 engine production from 4-5 per month to 8-11 per month.[12]

Supply chain management is more than a passing concept in the evolution of logistics management practices. In the past two decades, it has improved the effectiveness and efficiency of commercial and military operations through a process

[10] PricewaterhouseCoopers LLC, *Global Supply Chain Survey 2013* (Delaware: PricewaterhouseCoopers LLC, 2012), 8-9.

[11] U.S. Air Force, *Driving Transformation with DCOR and SCOR* (Washington, DC: U.S. Air Force, 2007), 20.

[12] U.S. Air Force, *The Air Force Global Logistics Support Center – War on Lack of Parts* (Washington, DC: U.S. Air Force, 2011), ii.

chain focus. This process chain focus has had revolutionary organizational influences that are producing end-to-end visibility, cost reductions, performance metrics, process improvement, and increased customer satisfaction. Supply chain management is broader than integrated logistics support, which is defined as "A composite of all the support considerations necessary to assure the effective and economical support of a system for its life cycle."[13] Additionally, it is more than a purely logistics concept due to its involvement in activities that are outside the scope of logistics. These activities include information systems, manufacturing, strategic sourcing, finance, business process connectivity, and risk management.

DoD Supply Chain

Within joint doctrine, the supply chain consists of the linked activities associated with providing materiel from a raw material stage to an end user as a finished product. Supply chain management is a cross-functional approach to procuring, producing, and delivering finished products and services to customers. This broad management scope includes sub-suppliers, suppliers, internal information, and funds flow.[14] Distribution actions support the supply chain by enabling the delivery of the "right things" to the "right place" at the "right time."[15] Furthermore, the supply chain operates within the broader context of force sustainment, which includes the provision of logistics and personnel services required to maintain and prolong operations until successful mission

[13] U.S. Joint Chiefs of Staff, *Joint Publication 1-02, Dictionary of Military and Associated Terms* (Washington, DC: U.S. Joint Chiefs of Staff, 2010), 151.
[14] Ibid., 296.
[15] Ibid., 94.

accomplishment.[16] Joint Publication 4-0, Joint Logistics, provides additional context by stating:

> The DOD supply chain is a global network that delivers materiel to the joint force. Its fundamental goal is to maximize force readiness while optimizing the allocation of resources. The logistic capabilities that contribute to the DOD supply chain include fulfillment of commodity requisitions from supply, the distribution capabilities from deployment and distribution, and movement and retrograde of repairable items to support maintenance activities. Supply chain management synchronizes the processes, resources, and efforts of key global providers to meet CCDR requirements.[17]

While supply chain management is not explicitly identified as a Joint Capability Area (JCA), its elements are incorporated in the Logistics JCAs for Deployment and Distribution, Maintain, and Supply. The JCA functional structure provides an important framework for capability analysis, strategy development, investment decision making, capability portfolio management, capabilities-based force development, and operational planning.[18]

The DoD supply chain consists of over 1 million uniformed, civilian, and contracted employees who support the military's 15,000 aircraft, 285 ships, 30,000 combat vehicles, and $90 billion in inventory.[19] USD(AT&L) establishes policy and implementing guidance, while ASD(L&MR) coordinates the implementation of policy.[20] Both of these offices utilize DASD(SCI) for governance, reporting, and integration of the

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[16] Ibid., 299.

[17] U.S. Joint Chiefs of Staff, *Joint Publication 4-0, Joint Logistics* (Washington, DC: U.S. Joint Chiefs of Staff, 2008), x.

[18] Director, Joint Force Development, Joint Chiefs of Staff, "Joint Capability Areas (JCAs)," U.S. Joint Chiefs of Staff, http://www.dtic.mil/futurejointwarfare/jca.htm (accessed January 20, 2013).

[19] Senate Subcommittee of the Committee on Homeland Security and Government Affairs, *High-Risk Logistics Planning: Progress on Improving Department of Defense Supply Chain Management. Hearing before the Oversight of Government Management, the Federal Workforce, and the District of Columbia*. 111th Cong., 2nd sess., July 27, 2010, 5.

[20] U.S. Department of Defense, *DoD Instruction 4140.01, DoD Supply Chain Materiel Management Policy* (Washington, DC: U.S. Department of Defense, 2011), 7.

end-to-end supply chain. In order to execute these duties, DASD(SCI) is organized as depicted in Figure 2.4.

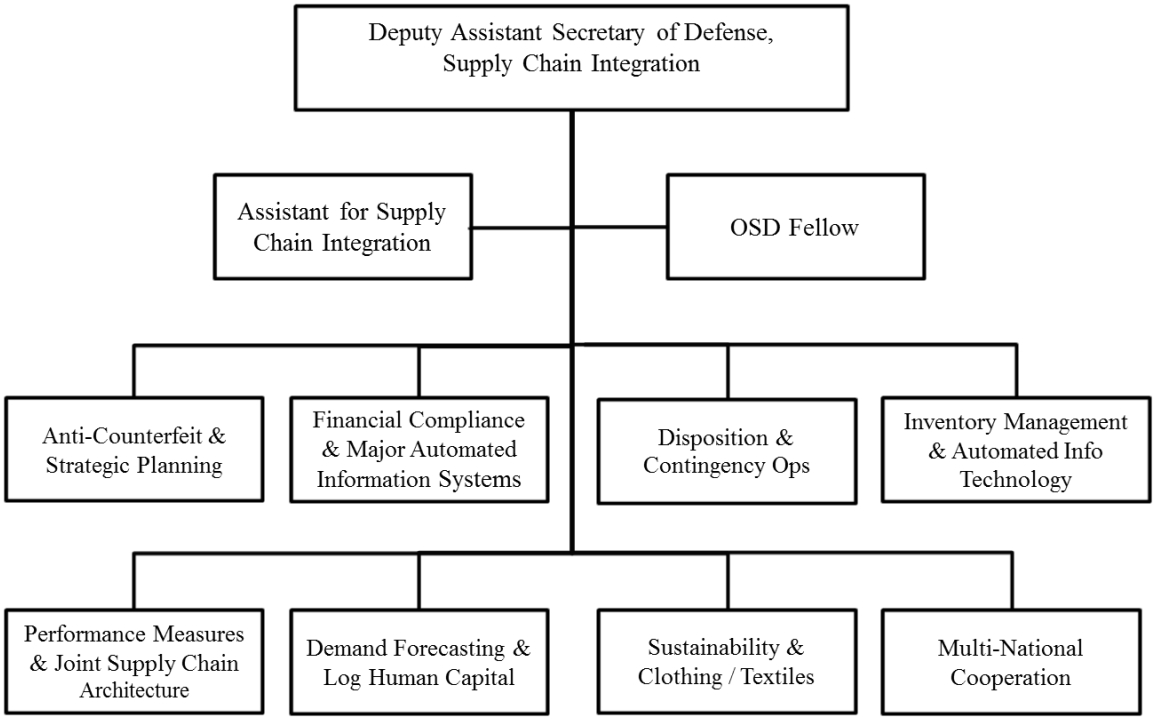

Figure 2.4. DASD(SCI) organization.[21]

USD(AT&L) establishes policy in DoD Instruction (DODI) 4140.01, DoD Supply Chain Materiel Management Policy, for the management of materiel across the DoD supply chain. The policy applies to all phases of materiel management, from operational requirement identification to weapon system retirement. Key aspects of the policy include: (1) Materiel management shall operate as a high-performing and agile supply chain, (2) Focus on responsiveness while balancing risk and total cost, (3) Provide best-value materiel and services, (4) Disruptions will be managed to mitigate risk to supply chain operations, and (5) Maintain accountability, control, and visibility of materiel. ASD(L&MR) is specifically tasked with materiel management, risk management, and

[21] U.S. Department of Defense, "SCI Organization," U.S. Department of Defense, http://www.acq.osd.mil/log/sci/organization.html (accessed November 6, 2012).

disposition policies, as well as the overall requirement to monitor the effectiveness and efficiency of DoD materiel management systems. DLA and the Military Services are tasked to implement policy and follow the procedures in the DoD 4140.01-R, Supply Chain Materiel Management Regulation. Lastly, DoD organizations are tasked to provide for an end-to-end materiel distribution system that is integrated and synchronized.

The procedural guidance within the DoDI 4140.01 is structured around the SCOR model, consisting of the processes of Plan, Source, Make and Maintain, Deliver, and Return. These processes provide a framework for developing, improving, and conducting materiel management throughout the DoD supply chain. Highlights of the procedural guidance for DoD organizations include:

1. Plan: Conduct demand and supply planning and precisely define requirements. Address demand forecasting, requirements definition, and inventory level setting. Maintain flexibility while minimizing DoD investment.

2. Source: Balance support goals, total supply chain costs, and performance factors. Utilize best value selection. Government owned inventory shall be maximized before seeking new support.

3. Make and Maintain: Materiel managers shall ensure best value support by optimizing relationships with organic and commercial suppliers and depot-level maintenance facilities.

4. Deliver: Provide for an integrated, synchronized, and end-to-end materiel distribution system. All materiel shall have an accountable record. Manage the positioning, requisitioning, and issuing of stock. Operate storage activities. Maintain asset visibility. Manage retrograde of materiel back to the national level and disposal.

5. Return: Make timely returns. Stratify or dispose. Return excess retail, depot-level, and defective materiel based upon economic considerations and customer requirements. Use materiel in the disposition system as much as practicable.

6. Technology: Materiel managers shall leverage modern technologies for resource planning. Use automatic identification technology for items in storage and movement. Maintain asset visibility. Use automated information technology to maintain accountability and control.

7. Reporting: Materiel managers shall report on the performance and cost of supply chain operations and inventory.

Regarding operational requirements, the DoDI 4140.01 specifies that "Best-value materiel and services shall be provided to support rapid power projection and operational sustainment of U.S. forces…,"[22] and that "All costs associated with materiel management, including acquiring, distributing, transporting, storing, maintaining, and disposing, shall be considered in making best value decisions throughout the DoD supply chain."[23] It further directs that risk management strategies will be used to mitigate disruptions in the supply chain caused by internal factors (e.g., unreliable suppliers, uncertain demand) and external factors (e.g., natural disasters, terrorism).[24]

In June 2003, the Defense Business Practice Implementation Board provided a report to the Secretary of Defense on the department's supply chain integration. In response to this report, the Secretary of Defense tasked USD(AT&L), serving as the Defense Logistics Executive, with the authority to make changes to integrate the global supply chain. Additionally, the Commander, USTRANSCOM was tasked as the Distribution Process Owner (DPO), responsible for distribution related activities, to include deployment, sustainment, and redeployment support.[25]

[22] U.S. Department of Defense, *DoD Instruction 4140.01, DoD Supply Chain Materiel Management Policy* (Washington, DC: U.S. Department of Defense, 2011), 10.
[23] Ibid.
[24] Ibid.
[25] Secretary of Defense, *Actions To Improve Logistics And Global Supply Chain Management* (Washington, DC: U.S. Department of Defense, 2003), 1.

Since its establishment in 1987, USTRANSCOM has managed the defense transportation system and provided air, land, and sea transportation solutions for DoD missions around the globe. The Air Mobility Command, Military Sealift Command, and Military Surface Deployment and Distribution Command enable USTRANSCOM to control the movement of personnel and materiel from a U.S. port of embarkation to an overseas port of debarkation within a Geographic Combatant Command. Furthermore, the Civil Reserve Air Fleet (CRAF) and Voluntary Intermodal Sealift Agreement (VISA) provide USTRANSCOM with surge capability through partnerships with commercial transportation providers.

USTRANSCOM is a Functional Combatant Command with the mission tasks to "Develop and direct the Joint Deployment and Distribution Enterprise to globally project strategic national security capabilities," and to "Provide end-to-end distribution process visibility and responsive support."[26] With these mission tasks, it is DoD's Single Manager for Transportation (other than Service-unique or theater-assigned assets), DPO, Distribution Portfolio Management Manager for Sustainment and Force Movement, and Global Distribution Synchronizer.[27] These responsibilities make USTRANSCOM a key link in the strategic, operational, and tactical chain of logistics, and require it to closely coordinate with the Combatant Commands, Military Services, interagency, DLA, and commercial transportation providers. Within the DoD supply chain, it provides the wholesale distribution capability and enables the execution of the replenishment cycle.

[26] U.S. Transportation Command, *USTRANSCOM 2011 Annual Report* (Scott Air Force Base, IL: U.S. Transportation Command, 2011), 2.

[27] U.S. Department of Defense, *DoD Directive 5158.04, United States Transportation Command (USTRANSCOM)* (Washington, DC: U.S. Department of Defense, 2007), 1-2.

In the execution of these responsibilities, the Commander, USTRANSCOM reports to the President through the Secretary of Defense.

The Defense Logistics Agency (DLA) is one of six DoD Combat Support Agencies (CSAs). It is subordinate to USD(L&MR) and has the mission to "provide effective and efficient worldwide logistics support to the Military Departments and the Combatant Commands."[28] With this mission, it supports the Defense Logistics Executive in the integration and improvement of the global supply chain, through collaboration with multiple entities, including the Military Services and USTRANSCOM. DLA's operational reach spans the entire DoD supply chain; from supplier to customer, and from the procurement cycle through the replenishment cycle. Furthermore, DLA is specifically tasked to collaborate with USTRANSCOM for distribution process improvement within the context of the Global Supply Chain Management System.[29]

Since its establishment in 1961, DLA has grown in size and scope to a current position that equates it to businesses in the top 10 percent of the Fortune 500. It provides the military services with 100 percent of requirements for subsistence, clothing and textiles, bulk fuel and packaged petroleum, oils, and lubricants, medical and surgical supplies, and construction and barrier material. Additionally, it provides repair parts for 85 percent of aviation, ground, and maritime equipment, which includes support for over 2,200 weapon systems. With these responsibilities, it manages nine supply chains and processes an average of 109,751 requisitions and over 8,985 contract actions each day. DLA also has a distribution capability, comprised of a worldwide network of 26 distribution depots that strategically position materiel to improve customer support.

[28] U.S. Department of Defense, *DoD Directive 5105.22, Defense Logistics Agency (DLA)* (Washington, DC: U.S. Department of Defense, 2006), 1.

[29] Ibid., 5.

Furthermore, DLA manages the Defense Reutilization Management System (DRMS) to receipt and manage military equipment once it has lost its useful purpose in the DoD. In this regard, it manages over $30 billion in annual reutilization and disposals.[30]

The Military Services maintain operational and tactical level capabilities that are part of the DoD supply chain, as well as being the primary customer of the supply chain. The capabilities they provide are aligned with the Title 10, United States Code logistics responsibilities of supplying, equipping, servicing, and maintaining. Furthermore, the Military Services' Title 10, United States Code logistics responsibilities include: (1) operate effectively, efficiently, and responsively, (2) fulfill the current and future operational requirements of the Combatant Commands, (3) assist other DoD organizations in the accomplishment of their respective functions by providing personnel, facilities, equipment, supplies, and services, and (4) develop, garrison, supply, equip, and maintain bases and other installations, including lines of communication, and provide administrative and logistical support for all assigned forces and bases.[31] These responsibilities position the Military Services within the DoD supply chain through the military capabilities that are provided to the Functional and Geographic Combatant Commands. Within these capabilities, the Military Services implement DoD-wide supply chain policies and directives to maintain supply chain effectiveness and efficiency.

As stated previously, DoD's supply chain management processes have been classified as "High Risk" by the GAO for the past 16 years. Through extensive research, the GAO has identified systemic weaknesses in the areas of management oversight,

[30] Defense Logistics Agency, "DLA at a Glance," Defense Logistics Agency, http://www.dla.mil/Pages/ataglance.aspx (accessed November 6, 2012).

[31] U.S. Department of Defense, *DoD Directive 5100.01, Functions of the Department of Defense and Its Major Components* (Washington, DC: U.S. Department of Defense, 2010), 25-26.

performance tracking, planning, policy, and processes. These governance related weaknesses translate into significant inefficiencies within the DoD supply chain. In September 2009 the DoD reported that it manages over 4 million secondary inventory items, valued at more than $91 billion. Secondary inventory items include reparable components, consumable repair parts, bulk items and material, subsistence, and expendable items such as clothing and personal equipment.[32] However, $10.3 billion of this inventory is excess and identified for reuse or disposal. Additionally, $15.2 billion of this inventory exceeds the approved acquisition objective and is being retained for economic purposes or for possible future contingencies. These two inventories account for 28 percent of the DoD's secondary inventory, equating to $25.5 billion in taxpayer funded defense supplies. The root causes of these excesses are ineffective and inefficient inventory management, poor demand forecast accuracy, and a lack of asset visibility through information technology solutions.[33]

In the National Defense Authorization Act for Fiscal Year 2010, the 111th Congress directed the improvement of inventory management practices of DLA and the Military Services, with the objective of reducing the acquisition and storage of secondary inventory that is excess to requirements. Section 328 (Improvement of Inventory Management Practices) of the Act highlighted the need for plans to address demand forecasting, total asset visibility, and secondary inventory. To assist the congressional defense committees in managing this oversight, GAO was tasked to remain engaged in assessing and reporting the aforementioned areas. This congressional oversight further

[32] U.S. Department of Defense, *DoD 4140.1-R, DoD Supply Chain Materiel Management Regulation* (Washington, DC: U.S. Department of Defense, 2003), 208.

[33] U.S. Government Accountability Office, *DOD'S 2010 Comprehensive Inventory Management Improvement Plan Addressed Statutory Requirements, But Faces Implementation Challenges* (Washington, DC: U.S. Government Accountability Office, 2011), 1.

highlighted the degree to which DLA and the Military Services are mismanaging taxpayer funded defense resources.

The July 2010 DoD Logistics Strategic Plan identifies two priorities for its business operations: support contingency business operations, and reform DoD's acquisition and support processes. The plan clarifies that the DoD logistics mission is to provide globally responsive, operationally precise, and cost effective joint logistics support. Furthermore, the plan provides supply chain related DoD-wide initiatives, to include: (1) developing enterprise-wide solutions for management of services and inventories that optimize total supply chain costs, (2) implementing effective demand planning to increase forecast accuracy and reduce costs, (3) implementing essential life cycle management and asset visibility initiatives, and (4) improving the safety and security of supply chain operations.

In this plan, the SCOR model is used to link logistics processes to integration and improvement efforts, and the Joint Supply Chain Architecture (JSCA) is highlighted in the effort to develop a common understanding of supply chain objectives and performance measures, as well as a means for providing unity of effort. The JSCA endeavors to "knock down the stovepipes that interfere with effectiveness and efficiency,"[34] and is becoming institutionalized across DoD. For each JSCA application, the goal is to create a consistent, reliable, and responsive supply chain that provides a high level of readiness at the best value. Thus far it has analyzed and improved the

[34] Mary P. Fletcher, "Joint Supply Chain Architecture," *Army Sustainment* 43, no. 2 (March-April 2011): 20.

supply chains of several multiservice weapon systems, including the H-60 helicopter, Close-In Weapon System (CIWS), C-130 Hercules, and Hellfire missile launcher.[35]

An important outcome of the 2010 DoD Logistics Strategic Plan's effort to reform DoD support processes is to integrate joint supply chains from source of supply to operational customers. One of the four goals listed in the plan is to "Improve supply chain processes, synchronizing from end-to-end and adopting challenging but achievable standards for each element of the supply chain."[36] The success indicators for this goal include effective and efficient supply chain management, optimal total supply chain costs through enterprise-wide solutions, effective demand planning to increase forecast accuracy and reduce costs, and fully implemented asset visibility initiatives. While there are numerous initiatives that support this goal, the following are considered critical: (1) implementation of the SCOR model, (2) development of the JSCA, (3) implement inventory management and stock positioning at DLA, (4) implement DPO strategic opportunities to improve enterprise-wide distribution, (5) implement automatic identification technologies into supply chain business systems, and (6) expand strategic sourcing of goods and services.[37] To remain current and relevant, the DoD Logistics Strategic Plan is reviewed and updated annually by ASD(L&MR), with USD(AT&L) providing updated priorities, measures, and goals, along with measuring progress and necessary corrective actions.

[35] Ibid., 23.

[36] Assistant Secretary of Defense for Logistics and Materiel Readiness, *Department of Defense Logistics Strategic Plan* (Washington, DC: U.S. Department of Defense, 2010), 22.

[37] Ibid., 23.

Future Joint Force Operating Environment

The future Joint Force will be required to operate in a resource constrained environment that is increasingly complex, uncertain, and competitive. Security challenges, driven by U.S. national interests, will occur regardless of borders and involve other states or increasingly powerful non-state actors. Operational access will vary, depending on the environment's domains, allies, partners, and enemy capabilities, and will likely limit the freedom of action of the Joint Force. Along with the Joint Force, the DoD supply chain will have to operate amidst security challenges. The National Strategy for Global Supply Chain Security highlights these security challenges, and emphasizes the need to protect and secure the supply chain from exploitation and disruption. These measures are re-enforced by U.S. and international community unified action and a resilient supply chain that mitigates risk.[38]

The CCJO focuses on the method of globally integrated operations to meet the requirements and security challenges of the future operating environment. This method envisions Joint Force elements postured around the globe forming quickly to utilize capabilities as a coherent operational whole. It must seize and exploit the initiative in time and across domains, while remaining discriminate to minimize unintended consequences. Furthermore, the Joint Force will be more tailored to the security challenge, operating across geographic areas to accomplish its mission. Global agility will be a critical capability, enabled through force positioning, prepositioned supplies, and rapid expeditionary basing. Transportation capabilities and the ability to quickly develop sea and air port capabilities in or near the operational area will facilitate global

[38] U.S. President, *National Strategy for Global Supply Chain Security* (Washington, DC: Government Printing Office, 2012), 1.

agility. Lastly, Joint Force sustainment will need to synchronize closely with operations and maintain enterprise-wide visibility of logistics processes, resources, and requirements.

Operational access is the ability to project military force into an operational area with sufficient freedom of action to accomplish the mission.[39] When operational access is contested by an enemy, it poses a threat to mission accomplishment and the Joint Force. Actions and capabilities will exist in the future operating environment to deny access to operating areas and limit freedom of action within operating areas. These anti-access and area-denial measures will require the Joint Force to leverage cross-domain synergy to establish superiority in select domains.[40] Attaining cross-domain synergy in the future operating environment will require a greater level of integration than currently exists. Integration will be needed between two broad efforts: overcoming an enemy's anti-access and area-denial capabilities through combat power, and logistically supporting the combat power over the required distances.[41] Yet enemy capabilities will not only be focused on our combat power, but also on attacking logistics command and control and distribution operations.[42] Therefore, the complete integration of these two efforts in the future operating environment will be essential to Joint Force success.

The Joint Concept for Logistics proposes an enterprise-wide solution to the problems faced in the future operating environment: the Joint Logistics Enterprise (JLEnt). The JLEnt's purpose is to "integrate our DoD capabilities (deployment and

[39] U.S. Joint Chiefs of Staff, *Joint Operational Access Concept (JOAC)* (Washington, DC: U.S. Joint Chiefs of Staff, 2012), 44.

[40] Ibid., ii. Cross-domain synergy is the complementary vice additive employment of capabilities in different domains such that each enhances the effectiveness and compensates for the vulnerabilities of the others.

[41] Ibid., 5.

[42] Ibid., 13.

distribution, engineering, operational contract support, logistics services, maintain, supply, and medical logistics) with those from the interagency, multinational, nongovernmental, and commercial world."[43] The result is a whole-of-government and global approach to resolving future challenges. Additionally, the JLEnt framework will optimize processes and capabilities, while managing resources in the effort to deliver, position, and sustain the Joint Force. The motivation for development of the JLEnt stems from DoD's previously fragmented organizational approach to joint theater logistics, which was further degraded by lack of specific goals and strategies, accountability for achieving results, and outcome oriented performance measures. DoD's efforts were also complicated by separate funding and management of resources and systems.[44]

[43] U.S. Joint Chiefs of Staff, *Joint Concept for Logistics* (Washington, DC: U.S. Joint Chiefs of Staff: 2010), iii.

[44] U.S. Government Accountability Office, *DOD'S HIGH-RISK AREAS. Progress Made Implementing Supply Chain Management Recommendations, but Full Extent of Improvement Unknown* (Washington, DC: Government Printing Office, 2007), 4.

CHAPTER 3: ANALYSIS

Policy and Strategy

The DoDI 4140.01, DoD Supply Chain Materiel Management Policy, provides concise policy but needs to differentiate clearly between supply chain management and materiel management. Instead of focusing solely on supply chain management, the policy incorporates materiel management, which is a vague logistics effort that is not defined in either Joint Publication 1-02, Dictionary of Military and Associated Terms, or Joint Publication 4-0, Joint Logistics. The policy defines materiel management as "That phase of military logistics that includes managing, cataloging, demand and supply planning, requirements determination, procurement, distribution, overhaul, and disposal of materiel."[1] This description is applicable to Military Service materiel managers in the execution of their Title 10, United States Code responsibilities, but it does not emphasize an interdependent process framework, such as supply chain management. Furthermore, in comparison to supply chain management, materiel management is not a modern and well developed concept that is globally recognized and understood.

As the sole DoD policy document regarding the supply chain, DoDI 4140.01 does not task an organization with the management or oversight of the end-to-end DoD supply chain. USD(AT&L) is tasked with "overall responsibility for improving and maintaining the Defense Logistics and Global Supply Chain Management System"[2] in DoD Directive 5134.01, Directive for USD(AT&L), but there is no other published policy. Fortunately,

[1] U.S. Department of Defense, *DoD Instruction 4140.01, DoD Supply Chain Materiel Management Policy* (Washington, DC: U.S. Department of Defense, 2011), 18.

[2] U.S. Department of Defense, *DoD Directive 5134.01, Under Secretary of Defense for Acquisition, Technology, and Logistics (USD(AT&L))* (Washington, DC: U.S. Department of Defense, 2008), 5.

DASD(SCI) maintains its role and mission, with the following supply chain responsibilities: (1) chairs the Supply Chain Executive Steering Committee, consisting of Flag-level representatives from the Joint Staff, Military Services, Defense Agencies, and Combatant Commands, (2) establishes strategic supply chain governance and reporting, and (3) in partnership with industry, oversee integration of end-to-end global logistics and supply chain performance.[3] Additional shortcomings of the DoD supply chain policy include no identification of the Supply Chain Process Owner, no incorporation of the concept of postponement,[4] a lack of whole-of-government approach, and no mention of Continuous Process Improvement (CPI) measures.

The Joint Logistics Directorate (J-4), Joint Staff integrates logistics planning and execution in support of joint force readiness and freedom of action, and advises the Chairman of the Joint Chiefs of Staff on logistics matters. To accomplish these tasks, the J-4 coordinates with the Office of the Secretary of Defense, Military Services, Combatant Commands, defense industrial base, interagency, and multinational partners. Although, the J-4 has no office dedicated to supply chain management, with the exception of a management effort towards JSCA development. Similarly, there is no mention of supply chain management in the Joint Logistics Strategic Plan 2010-2014 or the 2012 J-4 Annual Guidance from the Director, J-4. The 2010 Joint Concept for Logistics provides no substantive information regarding supply chain management, but does discuss a yet-

[3] Deputy Assistant Secretary of Defense, Supply Chain Integration, "Supply Chain Integration," U.S. Department of Defense, http://www.acq.osd.mil/log/sci/index.htm (accessed November 6, 2012).

[4] Sunil Chopra and Peter Meindl, *Supply Chain Management: Strategy, Planning, and Operation*, 5th ed. (Boston: Pearson Education, Inc., 2013), 339. Postponement is the ability of a supply chain to delay product differentiation or customization until closer to the time the product is used.

to-be assigned Joint Supply Process Owner (JSPO).[5] In the Supply, Deployment and Distribution, and Medical Logistics appendices, that address how to implement the Joint Concept for Logistics, the global supply chain is referenced as a mutually supporting effort that is essential to effective and efficient operations. Lastly, when compared to the 2010 DoD Logistics Strategic Plan, the aforementioned J-4 documents do not contain the appropriate degree of supply chain information.

An area not currently addressed in DoD policy or strategy is the concept of strategic fit. Strategic fit within an organization relates to how well the competitive strategy and supply chain strategy are aligned. The competitive strategy defines the customer needs that the organization wants to fulfill through products and services. The supply chain strategy identifies the broad structure of the supply chain and the nature of its stages and processes. Strategic fit requires that the goals of competitive strategy and supply chain strategy be aligned. Without adequate strategic fit, an organization will fail due to misalignment of supply chain capabilities and customer requirements.[6] The GAO's "High Risk" classification of the DoD supply chain management processes is a clear indication that strategic fit does not exist between the national defense strategy and the supply chain strategy. The excess secondary inventory represents a lack of understanding of the customer, supply chain uncertainty, and supply chain capabilities. Fragmented supply chain ownership, a key cause of poor strategic fit,[7] is evident in DoD policy and organizations. Without a Supply Chain Process Owner, each stage of the supply chain will focus on local objectives and degrade overall effectiveness and

[5] U.S. Joint Chiefs of Staff, *Joint Concept for Logistics* (Washington, DC: U.S. Joint Chiefs of Staff: 2010), D-5.
[6] Chopra and Meindl, 21.
[7] Ibid., 35.

efficiency. Additional examples of poor strategic fit are shown through supply chain analysis of H-60 helicopter support, the OIF supply chain, and the OEF supply chain.

Case Study: H-60 Helicopter Supply Chain

A comparison between DoD supply chain performance and commercial industry supply chain performance will quantify the need for change in DoD supply chain management. As a part of a USD(AT&L) and J-4 initiative to develop the JSCA, the U.S. Army's H-60 helicopter was used as a platform for supply chain analysis. In this 2009 analysis, supply chain metrics were captured that show the degree of difference between DoD and commercial industry performance.[8] A summary of the metrics are shown in Table 3.1.

Table 3.1. H-60 helicopter supply chain metrics.[9]

	H-60 fleet	Industry Average	Best In Class
Total Supply Chain Cost	19-21%	11%	5%
Demand Plan Accuracy	17%	86%	99%
Fill Rates	90%	86%	100%
Inventory Days of Supply	279%	94%	47%

Order Fulfillment Cycle Time*	H-60 fleet	OIF / OEF H-60s	Demonstrated
Routine	28 days	24 days	14 days
Priority	23 days	25 days	4-7 days

*Wholesale level. Does not include back orders.

When compared to the average commercial industry supply chain, the H-60 supply chain is inefficient in garrison and deployed environments. The costs of operating the H-60 supply chain are high, as represented by the total supply chain management cost and inventory days of supply. These costs could be lower if demand plan accuracy was

[8] Assistant Deputy Under Secretary of Defense for Materiel Readiness, *DoD Transition and Logistics Challenges* (Washington, DC: U.S. Department of Defense, 2009), 26.
[9] Ibid.

at the industry average, enabling lower inventory days of supply. The high fill rates are supported by the high levels of inventory, in spite of poor demand forecasting. Additionally, improved demand forecasting would improve the wholesale level order fulfillment cycle time, which is below the demonstrated military weapon system cycle time for both routine and priority requirements.

Case Study: OIF Supply Chain

Supply chain coordination requires information sharing between supply chain stages and an understanding of the impact of actions on other stages. Poor coordination stems from misaligned objectives or from untimely and incorrect information. Different stages may have misaligned objectives if each stage has a different owner, potentially resulting in optimal stages amidst a sub-optimal supply chain. Information that is untimely or incorrect will exist if information is not shared between stages, likely producing decisions that degrade the effectiveness and efficiency of the supply chain. An outcome of poor supply chain coordination is the bullwhip effect, where fluctuations in demand increase as they flow upstream through the supply chain. The bullwhip effect decreases product availability, and increases replenishment lead time and the cost of manufacturing, inventory, and transportation.[10]

OIF provides two examples of the bullwhip effect involving the U.S. Army, USTRANSCOM, and DLA. An effective supply chain for U.S. Army demands in OIF had been developed in the early years of OIF, thereby producing a focus on supply chain efficiency in 2006. In these examples, the supply chain spans from Continental U.S. (CONUS) manufacturers, to CONUS DLA distribution centers, to DLA's Defense Distribution Depot Kuwait, Southwest Asia (DDKS), to the U.S. Army units in OIF.

[10] Chopra and Meindl, 250-253.

In the first example, a high demand item for an essential piece of U.S. Army equipment is tracked to show the presence of the bullwhip effect during 2005 through 2007. Supply chain decisions affect the availability of the item as well as the costs incurred due to inventory, transportation, and material handling. The item was stocked in theater at DDKS due to its high demand and low price per pound. The ideal supply chain solution for this item would be to establish a DDKS safety stock level, based upon trends in theater demand and CONUS response time, and replenish DDKS using sealift once quantities fell below safety stock levels. Thus, item availability would support equipment readiness while minimizing costs from inventory, transportation, and material handling. The actual supply chain during this period had 71% of its demands sourced directly from CONUS. These actions were fulfilled through airlift and sealift modes of transportation, with widely different costs and response times. The significant use of airlift in late 2006 cost $3.3 million. While item availability in theater was consistently high during this period, an established DDKS safety stock level would have reduced overall supply chain costs by reducing the disproportionate transportation cost. Subsequent to this period, DLA obtained additional funding to maintain proper safety stock levels, thereby enabling a future balance between item availability and overall supply chain cost.[11]

In the second example, the U.S. Army, USTRANSCOM, and DLA agreed in 2006 to reduce airlift through improved theater inventory and alignment of shipping priorities and modes. A group of 100 supply items, incurring high airlift transportation costs, were categorized as airlift drivers and closely tracked. Many of these items were essential to equipment readiness and normally shipped by airlift when theater stocks were

[11] Eric Peltz and Marc Robbins, *Integrating the Department of Defense Supply Chain* (Santa Monica, CA: RAND Corporation, 2012), 7-11.

depleted. Yet poor coordination across the supply chain resulted in a subset of these items, essential for ground vehicle readiness, to be shipped by sealift. Low DDKS stock levels compounded the problem, which resulted in a bullwhip effect that occurred from 2007 through 2009. The bullwhip effect was documented for one of these items, beginning with low or no stockage at DDKS. With no established safety stock level, insufficient theater inventory was mitigated by airlift replenishment. The previously mentioned shift from airlift to sealift caused increased customer wait times, beginning in 2007. Additionally, the shift in transportation mode and resulting increase in customer wait time was not communicated throughout the supply chain. Customer wait times changed from approximately 10 days to as much as 80 days. As a result of this change, the number of vehicles that were not mission capable increased from less than 20 to as much as 120. Increased demand for the item required the mode of shipment to shift back to airlift, thereby significantly increasing overall supply chain costs. During 2008, DDKS stock levels were increased through sealift replenishment, and in 2009 the bullwhip effect subsided as wholesale stock levels sustained the retail demand with regular sealift replenishment. Regarding the item's supplier, requisitions for this item have not been needed since November 2010, due to the excess inventory caused by the bullwhip effect. Subsequently, the inconsistent demand has left the supplier's production capability off-line through the end of 2011. Significant off-line periods for suppliers reduce future responsiveness and increase the cost of future demands.[12]

These two OIF examples show the interdependent nature of a supply chain, as well as the importance of balancing effectiveness and efficiency in supply chain processes. While the organization of this OIF supply chain represents a well-developed

[12] Ibid., 9-19.

organization for deployed military operations (i.e., CONUS manufacturer, CONUS and deployed DLA elements, USTRANSCOM, and deployed military unit), the bullwhip effect still occurred. In each example, sub-optimal conditions existed due to poor management decisions at the wholesale level, resulting in higher supply chain costs and lower equipment readiness. Optimal conditions could have been achieved and maintained through improved information management and end-to-end supply chain decision making.

Case Study: OEF Supply Chain

Afghanistan is a land locked country with little infrastructure. Prior to 2009, all cargo that was not sensitive or classified was shipped into Afghanistan over ground routes through Pakistan. The ground route began at the seaport of Karachi, Pakistan, and entered Afghanistan after traveling through areas of heavy insurgent activity. In addition to insurgent activity, cargo throughput was degraded by road and weather conditions, pilferage, transportation delays, and political influences. To provide additional supply chain flexibility and redundancy, and to alleviate the strain on the Pakistan ground lines of communication (GLOC), USCENTCOM initiated actions in 2008 to establish a Northern Distribution Network (NDN). The Pakistan GLOC and NDN are shown in Figure 3.1.

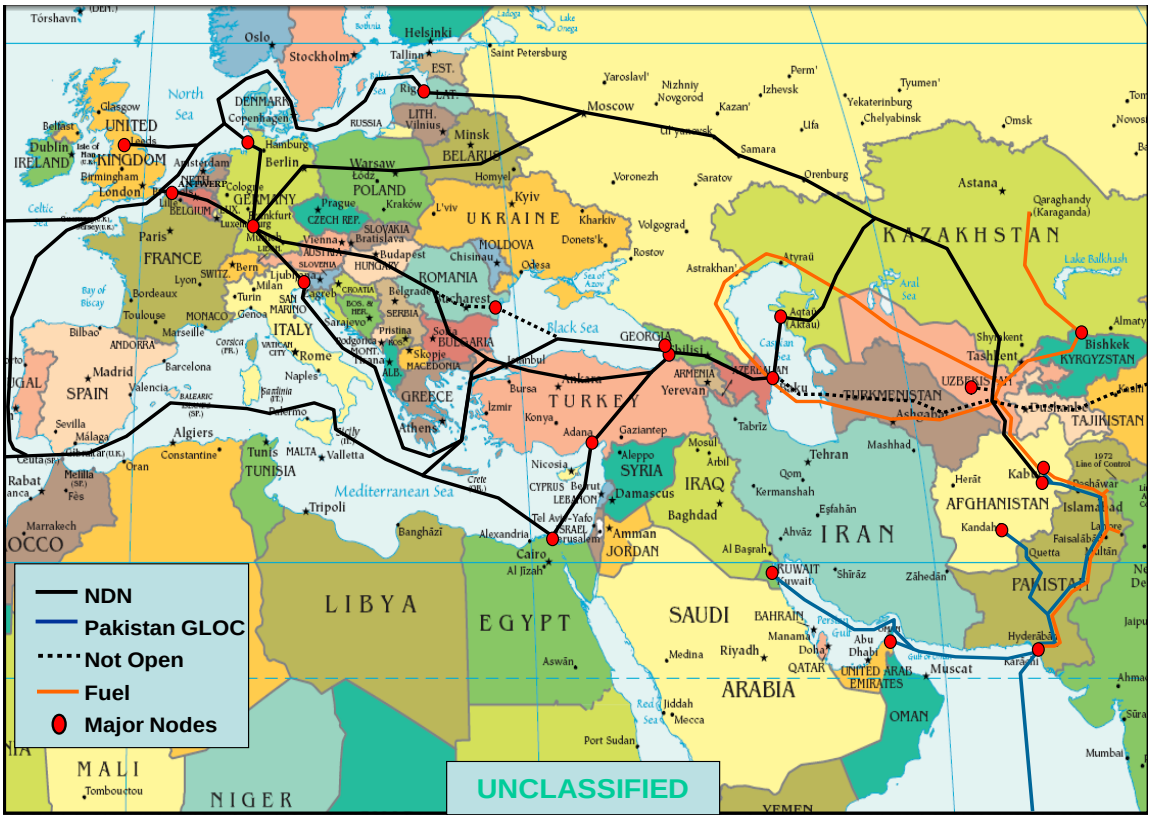

Figure 3.1. OEF distribution network.[13]

In early 2009, the first container shipments transited the NDN along a series of routes through Europe, the Caucasus, and the Central and South Asian States. The use of these routes required strategic engagement from U.S. Central Command (USCENTCOM), USTRANSCOM, Office of the Secretary of Defense (OSD), and the Department of State (DoS) in order to overcome challenges associated with access, transit agreements, and customs enforcement.[14] While primarily a ground logistics network, the NDN has three components: (1) three commercial based supply routes: Russia route, Caucasus route, and Kazakhstan / Kyrgyzstan / Tajikistan route, (2) a commercial air route into Uzbekistan, using Korean Airlines, with follow-on shipment

[13] U.S. Transportation Command, *Northern Distribution Network Planning and Implementation* (Scott Air Force Base, IL: U.S. Transportation Command, 2010), 16-17.

[14] Kenneth S. Dowd, "Building 'Log Nation' in the U.S. Central Command," *Army Sustainment* 42, no. 5 (September-October 2010): 6.

into Afghanistan by rail or truck, and (3) a "Central Asian States First" policy that directs procurement officials to seek supplies locally from NDN host nations. This policy required special legislation, documented in the 2010 National Defense Authorization Act, to provide DLA the authority to acquire products and services in Central and South Asian States.[15]

A constraint of the NDN is that transit agreements with most of the NDN host nations only allow nonlethal cargo. Therefore, the Pakistan GLOC is still used for most military unit cargo.[16] Amidst this constraint, the NDN has grown in throughput capacity from 200 twenty-foot containers per week in early 2009, to 42,380 twenty-foot containers in 2011.[17] The complexity of the establishment and execution of the NDN is characterized by a former USCENTCOM J-4 as "the NDN has proven to be far more than a logistics initiative. It is, in fact, a diplomatic engagement tool."[18] This complexity is visible in Figure 3.1 and captured by the numerous entities that comprise the NDN effort: (1) twelve major organizations (DoS, Department of Treasury, Central Intelligence Agency, OSD, Joint Staff, USCENTCOM, U.S. European Command (USEUCOM), USTRANSCOM, DLA, Government Services Agency, Defense Contract Management Agency, U.S. Agency for International Development), (2) ten foreign countries, (3) four foreign sea ports, (4) two foreign aerial ports, and (5) four commercial carriers.[19] Furthermore, USTRANSCOM describes the fully operational NDN as follows:

[15] U.S. Transportation Command, 3.
[16] Dowd, 6.
[17] U.S. Transportation Command, *USTRANSCOM 2011 Annual Report* (Scott Air Force Base, IL: U.S. Transportation Command, 2011), 15.
[18] Dowd, 6.
[19] U.S. Transportation Command, *Northern Distribution Network Planning and Implementation* (Scott Air Force Base, IL: U.S. Transportation Command, 2010), 9-10.

> …the entire region directly contributes to the re-supply of coalition forces and has a larger economic and strategic stake in the success of coalition Afghanistan operations. Thus, the true value of the NDN to date is not its cost benefit or transportation efficiencies, but rather how the NDN team comprised of USTRANSCOM, USCENTCOM, USEUCOM, DLA, the Joint Staff, and Department of State transformed logistic support to Afghanistan….[20]

The key lessons from the NDN are the impact that poor supply chain management had on OEF prior to the fully operational NDN in 2011, the length of time required to establish the NDN, and the complexity of establishing global supply chains in an operating environment where access is threatened or not assured. In this regard, OEF supply chain challenges are a good comparator to the anti-access and area denial challenges that are described in the CCJO and JOAC.

System and Organizational Factors

In Peter M. Senge's *The Fifth Discipline: The Art & Practice of The Learning Organization*, system performance and structure are analyzed using a classic supply chain learning tool: the beer game. The beer game was first developed in the 1960s at the Massachusetts Institute of Technology's Sloan School of Management. In this simulation of a production and distribution system, participants are tasked to manage their part of the beer supply chain in order to maximize profits. The supply chain consists of a retailer, a wholesaler, and a brewery manager, who each have visibility of their own supply and demand.[21] As the simulation is executed, the bull whip effect consistently occurs regardless of the participants' persistence. Through the beer game simulation, Senge concludes that organizational structure influences behavior more often than external factors or individual actions. He emphasizes that structure in human systems affects

[20] Ibid., 4.

[21] Peter M. Senge, *The Fifth Discipline: The Art and Practice of the Learning Organization* (New York: Currency Doubleday, 1994), 27-28.

behavior and decision making, and can limit the potential for new ways of thinking.[22] Specifically, he states:

> In the beer game, the structure that caused wild swings in orders and inventories involved the multiple-stage supply chain and the delays intervening between different stages, the limited information available at each stage in the system, and the goals, costs, perceptions, and fears that influenced individuals' orders for beer.[23]

Systems thinking is Senge's overarching solution to complex problems, as illustrated by the beer game example. Systems thinking is described as follows:

> …the discipline that integrates the disciplines, fusing them into a coherent body of theory and practice. It keeps them from being separate gimmicks or the latest organization change fads. Without a systemic orientation, there is no motivation to look at how the disciplines interrelate.[24]

He further describes how the systems perspective helps to organize the basic responses to complex situations. At the lowest level, events produce a reaction within an organization. At a higher level, behavioral patterns are used to respond to trends instead of individual events. At the highest level, organizational structure is used to address the underlying causes of organizational behavior. Senge clarifies that this highest level is the least common and most powerful approach to managing complex situations, and explains:

> Structure produces behavior, and changing underlying structures can produce different patterns of behavior. In this sense, structural explanations are inherently generative. Moreover, since structure in human systems includes the "operating policies" of the decision makers in the system, redesigning our own decision making redesigns the system structure.[25]

The structure of the DoD supply chain system consists of the defense industrial base, USTRANSCOM, DLA, and the Military Services. This system of systems performs with

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[22] Ibid., 40.
[23] Ibid., 44.
[24] Ibid., 12.
[25] Ibid., 52-53.

varying degrees of effectiveness and efficiency. Based upon Senge's views of system performance and structure, the primary method of improving DoD supply chain performance is through structural redesign. Proper structural redesign will create a systemic orientation, change policies and organizations, and improve event management, behavioral patterns, and decision making.

Charles H. Fine, in his book *Clockspeed: Winning Industry Control in the Age of Temporary Advantage*, describes an industry's rate of evolution as its clockspeed. Within industry, evolution occurs at different rates, depending on product clockspeed, process clockspeed, and organization clockspeed. For example, computer microprocessors have a clockspeed of two to four years, while commercial airliners have a clockspeed of several decades.[26] The drivers of clockspeed are technology and business competition. Failure to recognize these drivers prevents the opportunity for competitive advantage in the current global economy. Fine emphasizes that top organizations have the ability to anticipate where supply chain opportunities will arise, and to invest in the capabilities and relationships necessary to exploit them. His views on supply chain design are summarized as follows:

> Supply chain design ought to be thought of as assembling chains of capabilities, not just collaborating organizations, in the quest for a series of temporary advantages. Since no advantage lasts forever, these design activities must be ongoing, and therefore constitute the "core" capability of a firm in a dynamic economy.[27]

Additionally, Fine believes that "To build a company or a capability without regard for the chain in which it is embedded is a recipe for disaster."[28] Supply chain architecture is

[26] Charles H. Fine, *Clockspeed: Winning Industry Control in the Age of Temporary Advantage* (New York: Basic Books, 1998), 6-7.
[27] Ibid., 76.
[28] Ibid., 71.

described by Fine as being "focused on the ownership of assets in the supply chain."[29] He uses the concept of proximity to evaluate supply chain architecture. Proximity relates to the high, moderate, or low locality within the geographic, organizational, cultural, and electronic dimensions. A supply chain architecture that has high proximity is characterized as integral, while an architecture with low proximity is characterized as modular. Yet low levels of proximity in all dimensions would produce a supply chain that is unmanageable in an industry with a fast or moderate clockspeed. Therefore, high proximity is needed in at least one dimension for a supply chain to be effective and efficient.[30] The DoD has a moderate clockspeed that is based upon personnel, equipment, and operating environment factors. The DoD supply chain architecture is a mixed integral-modular architecture, meaning it has low geographic and organizational proximity and moderate cultural and electronic proximity. Based upon Fine's clockspeed and proximity concepts, improved proximity is needed in one or more dimensions for the DoD supply chain architecture to operate more effectively and efficiently.

Lieutenant General C. V. Christianson, U.S. Army (Retired), is the Director of the Center for Joint and Strategic Logistics at the National Defense University, and was the Joint Staff Director for Logistics from 2005 to 2008. He views the need for a global logistics command based upon the global dispersion of the U.S. military and the resulting need for global sustainment. In comparing commercial and military organizations, he states:

> In the commercial space, supply chain processes have been integrated for the most part through a single organizational element responsible for harmonizing a company's supply chain operations. These control elements ensure that the needs of the customer are directly linked to the

[29] Ibid., 136.
[30] Ibid., 136-138.

> source of supply, and that the two are tied together with an efficient and effective distribution system. Furthermore, they ensure that commercial supply chain planning is done in a collaborative and transparent manner. The defense supply chain, however, has no equivalent organization responsible for its overall performance.[31]

While he honors the Services' Title 10, United States Code responsibilities, and the Joint Force Commander's authorities identified in the Goldwater-Nichols Department of Defense Reorganization Act of 1986, he focuses on the capabilities provided by USTRANSCOM and DLA and their ability to operate in the future Joint Force environment. In the current DoD organization, he clarifies:

> …optimizing against a common outcome – is the ultimate goal of a 21st-Century supply chain, whether it be defense or commercial. In the current design, we will be challenged to work through differing organizational cultures, disconnected internal financial and business processes, and differing views on the outcomes we want to achieve.[32]

Christianson proposes that the USTRANSCOM headquarters be used to "build a new global support organization that would be held responsible to respond to the needs of the joint force," that DLA becomes a part of that organization, and that the new organization focus on "supply chain planning, flexible response, global risk analysis, and customer outcomes."[33] Alan F. Estevez, the current ASD(L&MR), does not view the joining of USTRANSCOM and DLA as a necessary measure, and states "They work very well together in sustaining the force on the battlefield."[34] He clarifies that each organization has a different mission and a different focus. Yet, the concept of a single

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[31] C. V. Christianson, "Global Dispersion, Global Sustainment: A Mandate for a Global Logistics Organization?" *Joint Force Quarterly* 65 (2nd Quarter 2012): 45.

[32] Ibid., 46.

[33] Ibid.

[34] Defense Acquisition University, "In Person: Assistant Secretary of Defense (L&MR), Alan F. Estevez," *Defense AT&L* (September-October 2012): 9.

DoD logistics organization has been proposed before by the Defense Science Board,[35] the Center for Strategic and International Studies,[36] and the Lexington Institute.[37] Each of these organizations have recommended a DoD logistics organization be created to have the authority and responsibility for end-to-end supply chain operations and management. Furthermore, while the Defense Business Practice Implementation Board did not recommend a similar DoD logistics organization, it did recommend that DoD elevate leadership for supply chain integration by creating an Under Secretary of Defense, who would have authority over supply chain integration and budgetary decisions, with USTRANSCOM and DLA as subordinate organizations.[38]

Best Business Practices

Gartner, Inc. is a world leading information and technology research company that annually identifies the commercial companies with the top supply chains. In its annual report, most recently "The Gartner Supply Chain Top 25 for 2012," the term "Top" is defined as those that performed well in the opinion of their peers, as well as through an evaluation of company Return On Assets (ROA), inventory turns, and revenue growth. Of the companies that best exemplify a customer focused ideal, Amazon, Apple, and Wal-Mart have consistently been in the top ten. Amazon is the online retail leader, with an unmatched grasp on internet-based supply chain management. Apple is a clear leader in operational and innovation excellence, with a business model that focuses on

[35] Defense Science Board, *Transformation: A Progress Assessment* (Washington, DC: Defense Science Board, 2006), 30.

[36] David Scruggs, *Beyond Goldwater-Nichols* (Washington, DC: Center for Strategic and International Studies, 2006), 25-27.

[37] Christine Brim, *Logistics Transformation: Next Steps to Interoperability and Alignment* (Arlington, VA: Lexington Institute, 2005), 11-12.

[38] Defense Business Practice Implementation Board, *TRANSCOM-DLA Task Group Report* (Washington, DC: Defense Business Practice Implementation Board, 2003), 2-3.

customer requirements and end-to-end supply chain management. Wal-Mart is the world's largest retailer and long-time advocate of supply chain control, as evidenced by being on the Gartner, Inc. top 25 list every year since it was first published in 2004.[39] Wal-Mart's business strategy brings lower prices to customers through a global supply chain that emphasizes business collaboration, planning, forecasting, and replenishment.

Within Wal-Mart's corporate headquarters, the Executive Vice President for Logistics and Supply Chain reports directly to the President and Chief Executive Officer (CEO). Further insight into their organizational structure is found in the Wal-Mart 2012 Annual Report, which states "Our Foundation: Technology-driven supply chain. In 1987, Wal-mart created a bold new competitive advantage with the completion of its satellite network, enabling real-time communication between stores, distribution centers and the Bentonville Home Office."[40] This reflects their focus on the end-to-end supply chain, leveraged with technology, and controlled by a single organizational element: the Bentonville Home Office. Most recently, this focus enabled the organization to reduce operating expenses as a percentage of sales for the second consecutive year.

Global corporations normally design their operating strategy objectives around the elements of technology, marketing, manufacturing, and logistics. While initiatives in all four areas should function synchronously, the logistics system serves as the global infrastructure upon which the other elements operate. Corporations have recognized that focused management of the global logistics system consistently provides a competitive

[39] Debra Hofman and Stan Aronow, *The Gartner Supply Chain Top 25 for 2012* (Stamford, CT: Gartner, Inc., 2012), 9.

[40] Wal-Mart Stores, Inc., *Wal-Mart 2012 Annual Report* (Bentonville, AR: Wal-Mart Stores, Inc., 2012), 12.

advantage.[41] Yet globalization and increased interdependence have introduced a higher level of supply chain volatility and vulnerability. In a 2008 survey of 400 supply chain senior executives from North America, Western Europe, and Asia Pacific, key findings were summarized as: (1) rapid and constant change is challenging the supply chain executive's ability to adapt, (2) supply chain executives struggle to see and act on correct information, and (3) risk management is necessary for successful global operations.[42] Supporting these findings, supply chain executives identified their major challenges as end-to-end visibility, risk management, cost containment, increasing customer demand, and globalization.[43] The initiatives that address these challenges are numerous, but a majority of corporations are dedicating resources towards the alignment of supply chain and business strategies, Continuous Process Improvement (CPI), cost reduction measures, internal organizational integration and visibility, and business performance measurement.[44] The survey also noted that efforts towards external organizational integration and visibility have produced low effectiveness.[45]

As shown in Wal-Mart's corporate headquarters, 46 percent of top supply chain companies have their supply chain executive report to the CEO.[46] The purpose of this relationship is explained as "The role of Chief Supply Chain Officer is emerging as a cross-line-of-business position reporting directly to the CEO. This testifies to the pivotal role supply chain executives play in the success of their companies."[47] These individuals

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[41] John J. Coyle, Edward J. Bardi, and C. John Langley Jr., *The Management of Business Logistics: A Supply Chain Perspective*, 7th ed. (Canada: South-Western, 2003), 151.

[42] IBM Global Services, *The Smarter Supply Chain of the Future: Global Chief Supply Chain Officer Study* (USA: IBM Corporation, 2009), 2.

[43] Ibid., 9.

[44] Ibid., 11.

[45] Ibid.

[46] Ibid., 53.

[47] Ibid., 54.

are responsible for managing the major functions of the supply chain, including distribution, logistics, sourcing and procurement, and demand planning.[48] The importance of the supply chain executive is captured in the statement "Perhaps more than any other C-suite role, the top supply chain executive must have an end-to-end understanding of the business, a broad view of external risks and the ability to manage holistically to produce optimal outcomes."[49]

Globalization and greater supply chain interdependence have made risk management an important organizational function. This management area focuses on identifying, assessing, and controlling risks that arise from operational factors, and making decisions that balance risk cost with mission benefits.[50] Of the three main recommendations presented in "The Gartner Supply Chain Top 25 for 2012" report, "a robust risk management strategy" was proposed to ensure supply chains are resilient and able to recover from disruptions caused by natural disasters, accidents, and intentional attacks.[51] This proposal matches the strategic approach discussed in the National Strategy for Global Supply Chain Security, wherein risk management is addressed through understanding and addressing vulnerabilities, comprehensive security measures, and a threat-based security posture.[52] Risk management is reported by 60 percent of supply chain executives as a challenge that significantly or very significantly impacts supply chain performance.[53] Of the top supply chain companies, 69 percent monitor risk,

[48] Ibid., 53.
[49] Ibid., 56.
[50] U.S. Joint Chiefs of Staff, *Joint Publication 1-02, Dictionary of Military and Associated Terms* (Washington, DC: U.S. Joint Chiefs of Staff, 2010), 267.
[51] Hofman and Aronow, 1.
[52] U.S. President, *National Strategy for Global Supply Chain Security* (Washington, DC: Government Printing Office, 2012), 4-5.
[53] IBM Global Services, 9.

with 31 percent managing performance and risk together.[54] This is accomplished with process controls, supplier compliance programs, the incorporation of risk management into supply chain planning, and event management to control supply chain disruptions.[55] Furthermore, the common traits that leading risk management organizations possess include continuous communication between employees, distributed power, workforce dedication, and conditioning for disruptive events.[56]

Cisco Systems, Inc. has successfully incorporated risk management practices into its business processes to improve resiliency and protect against catastrophic events. The company requires suppliers, manufacturing partners, and logistics centers to employ a supply chain risk framework that includes a resiliency index and crisis recovery metrics, plans, and pre-established capabilities.[57] These measures help Cisco Systems, Inc. maintain a competitive advantage while providing uninterrupted customer service. General Motors employs an Enterprise Risk Management Team to manage the vulnerabilities in its global supply chain. To assist in this effort, the team categorizes internal and external factors as either financial, strategic, hazard, or operations related vulnerabilities. This method enables vulnerabilities to be defined and prioritized for further use in managerial decision making and crisis response training scenarios.[58] Other methods exist to map supply chain vulnerabilities, including the basic quadrant chart. An example vulnerabilities quadrant chart is shown in Figure 3.2, comparing the consequences and probability of numerous disruptive events. Similar to the General

[54] Ibid., 18.
[55] Ibid., 17.
[56] Yosef Sheffi, *The Resilient Enterprise: Overcoming Vulnerability for Competitive Advantage* (Cambridge: The MIT Press, 2007), 255.
[57] IBM Global Services, 41.
[58] Sheffi, 24-26.

Motors vulnerability categorization, the vulnerability quadrant chart facilitates supply chain planning and resource prioritization. The chart can be easily tailored to an organization's operational environment and supply chain operations.

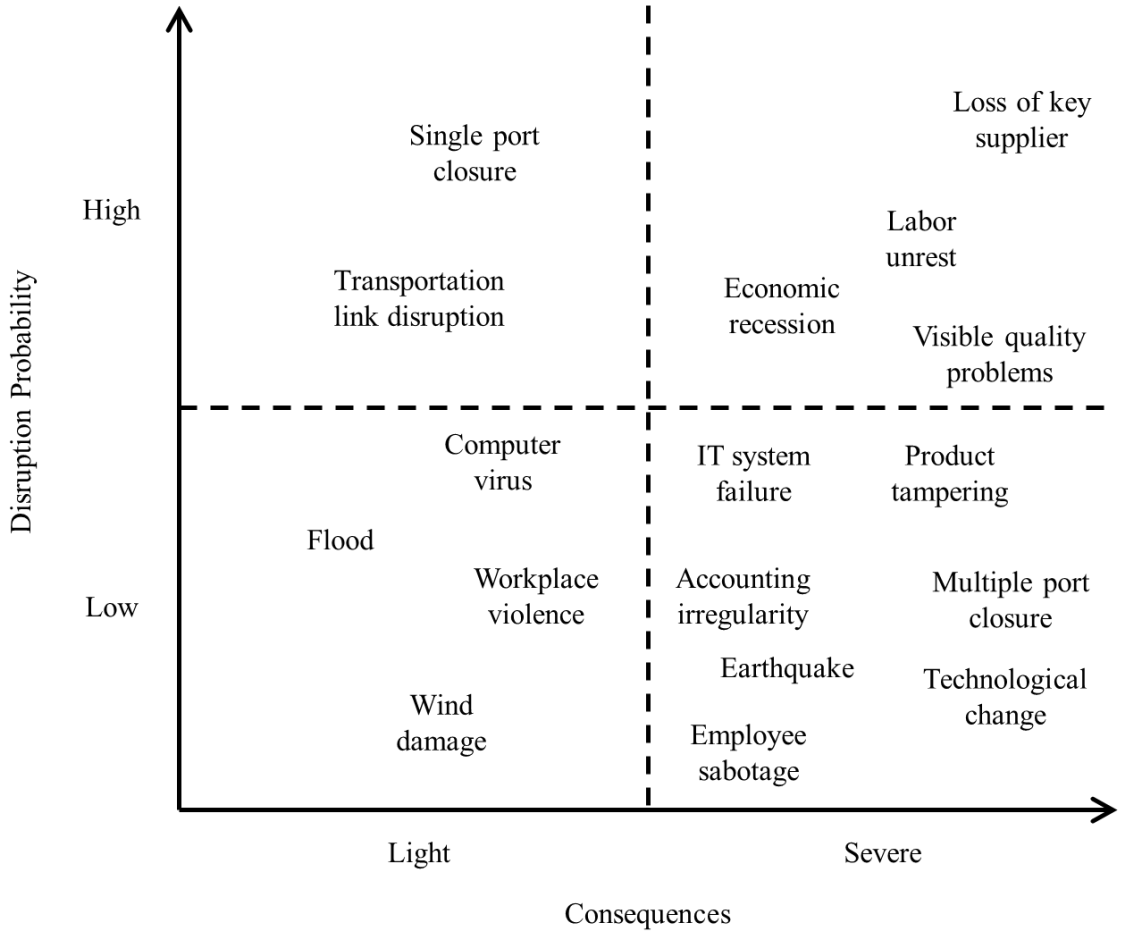

Figure 3.2. Vulnerability quadrant chart.[59]

Disruptive events are natural disasters, accidents, or intentional attacks that degrade the performance of the supply chain. Amidst the challenges of managing day-to-day supply chain operations, disruptive events can severely degrade supply chain effectiveness and efficiency. Examples of major disruptive events include Hurricane Katrina, the 2002 West Coast port lockout, and the 9/11 terrorist attacks. Each of these

[59] Ibid., 32.

events caused significant disruptions in the supply chain operations of national and global organizations. With each disruption, a profile exists that follows a common path from the disruptive event through supply chain recovery. Figure 3.3 displays the disruption profile, which includes the common elements that vary in severity and duration depending on the disruptive event. Organizations can mitigate the impact of disruptive events by focusing on preparations, first response, and recovery. By doing so, the delayed, full, and long term impact on performance will be reduced across the supply chain. This effort, combined with the vulnerability quadrant chart, will enable organizations to manage risk systematically within a complex operating environment.

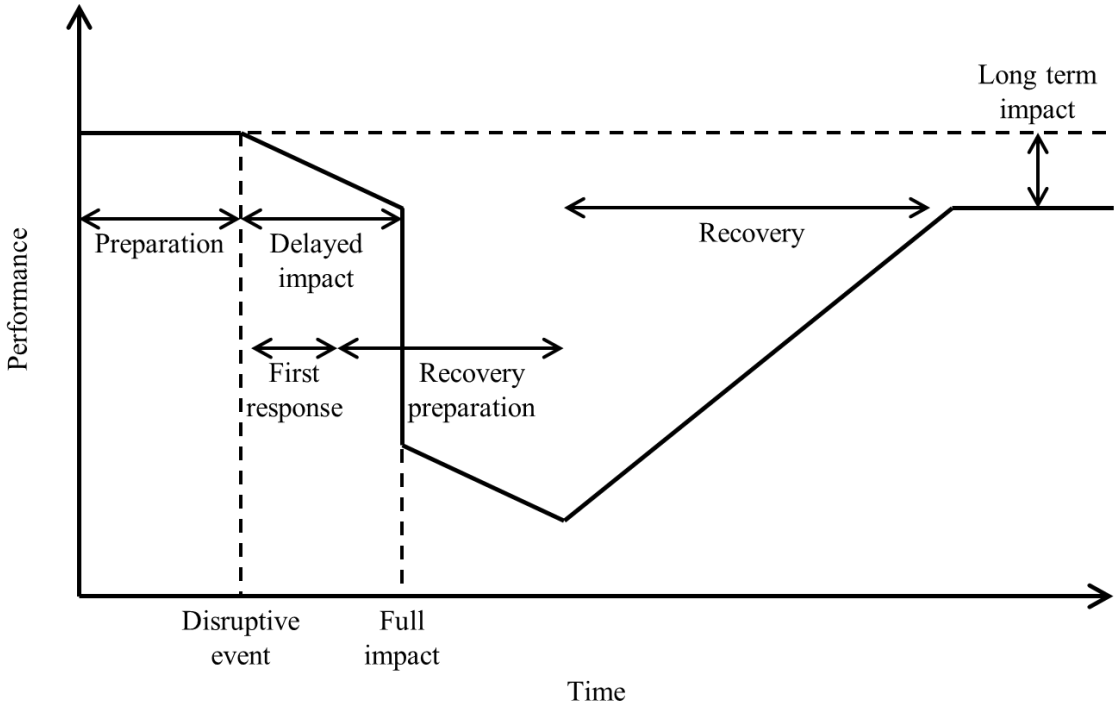

Figure 3.3. Disruption profile.[60]

Continuous Process Improvement (CPI) concepts and methods are widely used in the commercial sector and DoD to assess and improve the effectiveness and efficiency of

[60] Ibid., 65.

key processes. Within the supply chain, CPI is applied to each process cycle to improve procurement, manufacturing, replenishment, and ordering. The most common CPI programs include:

1. Lean: A systematic approach to identifying and eliminating process waste, and maximizing resource savings to meet other requirements. Commonly used in manufacturing and production processes.

2. Six Sigma: A methodology for increasing profits by reducing variability, defects, and process waste. Commonly used in manufacturing and production processes, and for business process improvement. Formal training provides skills that are certified (i.e., Green Belt, Black Belt).

3. Theory of Constraints: A methodology for scheduling and controlling resources, and measuring system performance. The theory emphasizes that proper management of process constraints will affect the output of the entire system. The theory can be applied to any process-based system.[61]

One example of a successful use of CPI programs is Dell Inc., a leading computer manufacturer that is consistently on the Gartner, Inc. "Supply Chain Top 25" list. Their consistent top performance is the result of an organizational culture that is based on four tenets: (1) obsession with results, (2) teamwork and communications, (3) value of personal relationships, and (4) leadership at all levels.[62] In support of these tenets, Dell Inc. utilizes a Six Sigma program to improve its business processes and empower its workforce. Yet, instead of focusing on training executives and certifying a limited number of Black Belts, Dell Inc. trains lower-level employees in the basics of Six Sigma. Through this training, Dell Inc. has certified thousands of employees as Green Belts and Yellow Belts. This training, and the business' egalitarian culture, empowers individuals to be innovative and enterprising in solving problems. While disruptions occur within the

[61] U.S. Department of Defense, *Continuous Process Improvement Transformation Guidebook* (Washington, DC: U.S. Department of Defense, 2006), G-5 – G-9.

[62] Sheffi, 245.

Dell Inc. supply chain, the Six Sigma program has prepared their employees to provide flexible responses that minimize the impact on supply chain performance.[63]

[63] Ibid., 247-248.

CHAPTER 4: RECOMMENDATIONS

Policy and Strategy

Strategic-level change is necessary in the DoD approach to supply chain management in order to guide DoD's efforts into the future. Without strategic-level change, sub-optimal conditions will persist amidst efforts to improve organizations, management, and processes. Furthermore, strategic-level change is warranted due to the challenges in the future operating environment, including those presented in the National Strategy for Global Supply Chain Security.

The DoD policy for supply chain management needs to focus solely on supply chain management, and not be combined with materiel management guidance. This policy can reside in a modified DoDI 4140.01, thereby focusing on policy for supply chain stages, processes, and flows. The current responsibilities in DoDI 4140.01 must focus solely on supply chain management, and incorporate all major organizations that participate in the end-to-end supply chain. Additionally, the policy should task a functional Combatant Command organization to be the Supply Chain Process Owner, responsible for the overall effectiveness, efficiency, and alignment of DoD-wide supply chain operations.

To support a successful strategic-level policy, the strategy for the DoD supply chain must seek to optimize the end-to-end DoD supply chain. The 2010 DoD Logistics Strategic Plan provides a clear emphasis on the end-to-end DoD supply chain, and properly addresses the systemic weaknesses identified by the GAO. The current strategy of the J-4 does not emphasize the supply chain in the broader DoD logistics framework, thereby limiting the evolution of logistics activities to integration-based advancements.

The incorporation of end-to-end supply chain concepts, processes, and practices into the J-4's strategic plans and joint logistics concepts will communicate why an optimal end-to-end supply chain will enable future Joint Force success. Concepts, processes, and practices must keep pace with future Joint Force requirements and the future operating environment, and be informed by best business practices. By doing so, the strategic fit of the defense strategy and supply chain strategy will improve, thereby preventing poor supply chain performance, as was shown in the H-60 helicopter, OIF, and OEF supply chain case studies. Additionally, the Supply Chain Council should be leveraged throughout DoD to assist with developing and maintaining best business practices that enable optimal support within the military environment. Similarly, partnering with leading supply chain organizations, such as those identified annually by Gartner, Inc., must occur to ensure best business practices are recognized and incorporated into DoD policy and strategy.

Organizational

The addition of Supply Chain as a Logistics JCA, along with the appropriate subordinate JCA capabilities, will initiate fundamental changes within the DoD. This JCA change will support end-to-end supply chain capability analysis, strategy development, investment decision making, capability portfolio management, capabilities-based force development, and operational planning. This additional JCA will have impacts throughout the JCA framework, as the current Deployment and Distribution, Maintain, and Supply JCAs will need to be modified to incorporate the new Supply Chain JCA capabilities.

High level organizational changes will provide DoD with the systemic focus that supply chain management requires in the future Joint Force operating environment. Senge's views of system performance and organizational structure reflect that the best method to improve DoD supply chain performance is to re-design the supply chain organization. Similarly, organizational changes are necessary to improve the proximity that Fine states is necessary for an effective and efficient supply chain. Elevating the current Supply Chain Integration office to an ASD-level office will identify it as a major activity within USD(AT&L), and increase USD-level office awareness of the DoD supply chain. This change reflects the best business practice of positioning supply chain executives high in the organizational hierarchy. The new ASD(SCI) office can use the structure of the existing DASD(SCI) office, along with creating a new Risk Management Office. Furthermore, a dedicated Supply Chain Office in the J-4 should be created, under the Deputy Director for Operational Logistics, to focus the broader joint logistics community on supply chain strategy and management. This new office can manage supply chain policy and strategy with OSD-level offices, while executing appropriate Joint Staff functions in regards to supply chain integration.

The 2003 designation of USTRANSCOM as DPO was an important improvement in DoD, but it was not enough to create evolutionary changes in the existing DoD supply chain. Similarly, the JLEnt's unity of effort approach will only produce mid- term affects that will not be as comprehensive as needed in the future operating environment. An increased measure of unity of command is necessary within the DoD supply chain in order to properly manage the complex end-to-end process. As proposed by Christianson, a modified USTRANSCOM headquarters should serve as the organization that leads

DoD supply chain management and execution. To provide a greater level of unity of command within the DoD supply chain, DLA should become a subordinate organization within this modified Combatant Command. No changes are proposed for the current organizations within USTRANSCOM (e.g., Air Mobility Command) or for the Military Services. The new organization should possess the authority and responsibility to manage and execute end-to-end DoD supply chain operations. The flow of information, products, and funds will be better managed with a single Combatant Command headquarters, as opposed to the current fragmented approach. Additionally, operational access challenges will be better managed through coordination with DoS and adjacent Combatant Commands. Most importantly, the change will operationalize supply chain management at the Combatant Command level, leveraging unity of command to optimize the complete process in support of Joint Force requirements.

Management and Processes

Risk management is necessary for successful supply chain operations due to globalization and greater supply chain interdependencies. The OEF supply chain case study presents a strong example of the importance of risk management within DoD logistics. To prevent the impact of disruptions on future DoD supply chains, risk management must be incorporated into organizational culture, planning, and operations. This will mitigate vulnerabilities through increased supply chain security, flexibility, and redundancy. The goal is a resilient supply chain that minimizes the impact of disruptions. To ensure this goal is met, a supply chain risk management office should be established in the OSD-level SCI office, the J-4, and the modified Combatant Command

headquarters. These additions will ensure supply chain risk management is incorporated into policy, strategy, the DoD supply chain, and Combatant Command plans.

The SCOR model's application within DoD must be expanded to strengthen linkages between processes, metrics, technology, and best business practices. The model's framework should be required for supply chain initiatives that affect DoD-wide processes and major Military Service programs. Its use will enable unified action through a common framework that supports communication among supply chain elements, ultimately improving the effectiveness and efficiency of the supply chain. As shown in this thesis research, the U.S. Air Force has benefitted from several applications of the SCOR model. For complex supply chain initiatives, the Supply Chain Council could be used to assist with SCOR model training and applications. Similar to the increased use of the SCOR model, the JSCA initiative must continue to be institutionalized across DoD. Beyond its focus on weapon system supply chains, the JSCA initiative must be leveraged to promote the SCOR model, provide benchmarks for DoD-wide performance standards, influence decision making towards an optimal supply chain, and inform DoD-level policy and strategy. Furthermore, OSD and the J-4 must ensure that the JSCA is applied to weapon system programs that are cost and readiness drivers, in order to have the greatest return on investment.

CPI programs are essential to improving DoD supply chain effectiveness and efficiency. DoD Directive 5010.42, DoD-Wide Continuous Process Improvement (CPI) / Lean Six Sigma (LSS) Program, provides policy that is further refined in the DoD Continuous Process Improvement Transformation Guidebook. The use of the established CPI methods of Lean, Six Sigma, and Theory of Constraints, and the training and proper

placement of Green Belts and Black Belts, is necessary to maintain a culture of continuous improvement. CPI programs should be implemented in organizations that require improvement in the areas of reliability, process cycle times, resource consumption, quality, and productivity. The training and utilization of Green Belts and Black Belts will improve and sustain programs that target effectiveness and efficiency within supply chain processes. While Black Belts are critical to leading process improvements at the DoD and Military Service levels, Green Belts should be trained throughout DoD and down to the lowest organizational levels (i.e., battalion, squadron). A CPI culture must grow throughout DoD in order to assist in optimizing the limited resources of the future operating environment.

Further Study

The thesis research focused on optimizing the DoD supply chain for the future Joint Force. Through the literature review, organizational and supply chain management research, analysis of policy and supply chain operations, and analysis of best business practices, several topics are presented for further study. The nation's current and future fiscal challenges were briefly discussed in this thesis research, but can be explored to a greater extent in relation to the impact on the DoD logistics community. Similarly, the National Strategy for Global Supply Chain Security presents goals for an efficient, secure, and resilient global supply chain. The incorporation of this national strategy into DoD policy and strategy is necessary, and can be studied for the benefit of policy and strategy at the OSD and Joint Staff levels. Regarding OSD, a review of the OSD organizational structure, in relation to the future operating environment and best business practices, can offer organizational improvements to better position DoD within the U.S.

government and global environment. The top supply chain organizations, identified annually by Gartner, Inc., could serve as a start point for this organizational structure review. Lastly, this thesis research recommended a modified USTRANSCOM headquarters, and subsequent re-organization of that Combatant Command, to provide an increased measure of unity of command within the DoD supply chain. This topic would benefit from further study of the necessary organizational changes, authorities, and responsibilities, to ensure the resulting organization produces a beneficial return on investment.

CHAPTER 5: CONCLUSION

History has consistently proven that the military force that understands the operating environment and adapts to change will be successful in the conduct of warfare. The future operating environment has been adequately defined to make the necessary changes in the DoD. Hard decisions are upon our national and military leadership to change the DoD to be ready for the complex challenges of the future operating environment. Amidst this environment, resource constraints will produce military-wide reductions and necessitate a more economical approach to global logistics. As efficiencies are achieved, though, global logistics must effectively sustain the Joint Force. A key factor of success or failure is the effectiveness and efficiency of the logistics enterprise, of which the supply chain is the enabling capability. As reflected in the three case studies and highlighted by Senge, Fine, and Christianson, the current DoD supply chain is operating at its highest potential, and is neither effective nor efficient enough to fully support the Joint Force in the future operating environment. This environment contains resource constraint challenges and global complexities, such as anti-access and area-denial measures. Therefore, a new emphasis is needed to achieve an optimal strategic fit between the national defense strategy and the supply chain strategy. The fit will be made possible by the recommendations contained in this thesis research, addressing changes in policy, strategy, organizational structure, management, and processes. The breadth and depth of these changes will only be possible through a re-focusing of DoD logistics towards the end-to-end supply chain. Without this re-focusing, the DoD supply chain will be unable to meet the requirements of the Joint Force amidst the demands of the future operating environment. Furthermore, best business practices in

the commercial sector and military organizations must continue to provide benchmarks to strive towards and achieve. Once identified, these practices must be adopted and adapted to the military logistics environment to keep DoD supply chain management on the leading edge of global logistics. Finally, with the changes proposed in this thesis research, the DoD supply chain will become optimized to meet the requirements of the future Joint Force.

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VITA

PII Redacted

Lieutenant Colonel Reuter was born in Erie, Pennsylvania. He received his commission as a Second Lieutenant in the Marine Corps from the U. S. Naval Academy in May 1993. He is [redacted].

His Marine Corps Operating Force assignments include: S-4 Officer, Aviation Ground Support Element (now Marine Wing Support Squadron 374) (January 1995 – May 1997); Assistant S-4 Officer / Maintenance Management Officer, 31st Marine Expeditionary Unit (June 1997 – June 1998); S-3 Officer, MEU Service Support Group 31 (July 1998 – July 1999); S-4 Officer, 8th Marine Regiment (June 2003 – July 2005) which included service as S-4 Officer, Marine Air Ground Task Force 8 in Haiti and S-4 Officer, Regimental Combat Team 8 in Iraq; Assistant Chief of Staff G-4, 2nd Marine Logistics Group (July 2009 – December 2009); Executive Officer, Combat Logistics Regiment 27 (January 2010 – March 2010); Commanding Officer, Combat Logistics Battalion 22 (April 2010 – April 2012).

His Marine Corps Supporting Establishment assignments include: Officer In Charge, Combat Service Support Section and Company Commander, Combat Service Support Company, Logistics Operations School (June 2000 – May 2003); and Head, Logistics Operations Analysis Branch, Installations and Logistics Department, Headquarters Marine Corps (October 2007 – June 2009).

His education background consists of: Bachelor of Science in General Engineering from the U. S. Naval Academy (May 1993), Amphibious Warfare School (May 2000), Master of Engineering in Engineering Management from the University of Colorado at Boulder (May 2003), Marine Corps Command and Staff College (non-

resident) (January 2007), and Master of Science in Operations Research from the Naval Postgraduate School (September 2007).

His personal decorations include the Meritorious Service Medal with two gold stars, Navy and Marine Corps Commendation Medal with two gold stars, Joint Service Achievement Medal, and Combat Action Ribbon.